

What is claimed is:

1. A constant-voltage circuit comprising:

a constant-current portion for allowing an electric current to start flowing, when a start signal is supplied, to output a first control signal and a second control signal of predetermined levels and continue outputting said first and second control signals after said start signal is ceased;

a reference voltage portion for outputting a first reference voltage when only said first control signal is supplied and for outputting a second reference voltage higher than said first reference voltage when said first control signal and said start signal are supplied at the same time; and

an output portion for outputting a constant internal voltage corresponding to either one of said first and second reference voltages output from said reference voltage portion when said second control signal is supplied.

2. The constant-voltage circuit according to claim 1, wherein

said output portion includes switching means for outputting an externally applied supply voltage as said internal voltage irrespective of said second control signal and said first or second reference voltage when a mode signal designating a high-load mode is supplied.

3. The constant-voltage circuit according to claim 1, wherein

said constant-current portion comprises:

a first transistor connected between a first node for outputting said first control signal and a source potential, the conduction state of said first transistor being controlled by said first control signal;

a second transistor connected between a second node for outputting said second control signal and the source potential, the conduction state of said second transistor being controlled by said first control signal;

10 a third transistor connected between said first node and a third node, the conduction state of said third transistor being controlled by said second control signal;

a resistor connected between said third node and a ground potential;

15 a fourth transistor connected between said second node and the ground potential, the conduction state of said fourth transistor being controlled by said second control signal; and

a fifth transistor connected between said first node and said third node, the conduction state of said fifth transistor being controlled by said start signal,

said reference voltage portion comprises:

a sixth transistor connected between a fourth node for outputting a reference voltage and the supply voltage, the conduction state of said sixth transistor being controlled by said first control signal;

a first constant-voltage device connected between said fourth node and the ground potential, and

a second constant-voltage device to be connected in parallel to said first constant-voltage device when said  
5 start signal is supplied, and

said output portion comprises:

a differential amplifier having a non-inverting input terminal provided with said reference voltage, an inverting input terminal connected to an output node for  
10 outputting said internal voltage, the bias current of said differential amplifier being controlled by said second control signal;

a seventh transistor connected between the supply voltage and said output node, the conduction state of said  
15 seventh transistor being controlled by an output signal from said differential amplifier; and

an eighth transistor connected between said output node and the ground potential, the conduction state of said eighth transistor being controlled by said second  
20 control signal.

4. The constant-voltage circuit according to claim 1, wherein

said constant-current portion comprises:

a first transistor connected between a first node  
25 for outputting said first control signal and a source potential, the conduction state of said first transistor

being controlled by said first control signal;

a second transistor connected between a second node for outputting said second control signal and the source potential, the conduction state of said second transistor  
5 being controlled by said first control signal;

a third transistor connected between said first node and a third node, the conduction state of said third transistor being controlled by said second control signal;

a first resistor connected between said third  
10 node and a ground potential;

a fourth transistor connected between said second node and the ground potential, the conduction state of said fourth transistor being controlled by said second control signal; and

15 a fifth transistor connected between said first node and said third node, the conduction state of said fifth transistor being controlled by said start signal,

said reference voltage portion comprises:

a sixth transistor connected between a fourth  
20 node for outputting a reference voltage and the supply voltage, the conduction state of said sixth transistor being controlled by said first control signal;

a first constant-voltage device connected between said fourth node and the ground potential; and

25 a second constant-voltage device to be connected in parallel to said first constant-voltage device when said

start signal is supplied, and

said output portion comprises:

a differential amplifier having a non-inverting input terminal provided with said reference voltage, an  
5 inverting input terminal connected to a fifth node, the bias current of said differential amplifier being controlled by said second control signal;

a seventh transistor connected between the supply voltage and an output node for outputting said internal  
10 voltage, the conduction state of said seventh transistor being controlled by an output signal from said differential amplifier,

a second resistor connected between said output node and said fifth node,

15 an eighth transistor connected between said fifth node and the ground potential, the conduction state of said eighth transistor being controlled by said second control signal, and

a ninth transistor connected in parallel to said  
20 first resistor, the conduction state of said ninth transistor being controlled by said start signal.

5. The constant-voltage circuit according to claim 3, wherein

said output portion includes a switching transistor  
25 connected between the supply voltage and said output node, the conduction state of said switching transistor being

controlled by a mode signal.

6. The constant-voltage circuit according to claim 4,  
wherein

said output portion includes a switching transistor  
5 connected between the supply voltage and said output node,  
the conduction state of said switching transistor being  
controlled by a mode signal.